MODIS Surface Reflectance; Atmospheric Correction Algorithm Products (also called Spectral Reflectance)

Product Description

The MODIS surface reflectance product, MOD 09 (#2015), is a seven-band product computed from the MODIS Level 1B land bands 1, 2, 3, 4, 5, 6, and 7 (centered at 648 nm, 858 nm, 470 nm, 555 nm, 1240 nm, 1640 nm, and 2130 nm, respectively). The product is an estimate of the surface spectral reflectance for each band as it would have been measured at ground level if there were no atmospheric scattering or absorption.

The correction scheme includes corrections for the effect of atmospheric gases, aerosol, and thin cirrus clouds; it is applied to all noncloudy MOD 35 (#3660) Level 1B pixels which pass the Level 1B quality control. The correction uses band 26 to detect cirrus cloud, water vapor from MOD 05 (#1874), aerosol from MOD 04 (#2293), and ozone from MOD 07 (#1333); best available climatology is used if the MODIS water vapor, aerosol, or ozone products are unavailable. Also, the correction uses MOD 43 (#3669), BRDF without topography, from the previous 16-day time period for the atmosphere-BRDF coupling term.

Research & Applications

The surface reflectance product is the input for product generation for several land products: Vegetation Indices (VIs), BRDF, thermal anomaly, snow/ice, and Fraction of Photosynthetically Active Radiation/Leaf Area Index (FPAR/LAI). It is, therefore, an important and essential product. The at-launch version will be fully operational.

Data Set Evolution

Because of the novelty of the at-launch MODIS aerosol product (MOD 04) over land and the cirrus detection, the inclusion of the correction for aerosol and thin cirrus clouds will be implemented following at launch thorough evaluation of these products.

Suggested Reading

Vermote, E.F., *et al.,* 1996.

MOD 09
PRODUCT SUMMARY

Coverage:
 global land surface (Level 2)

Spatial/Temporal Characteristics:
 bands 1 and 2: 250 m
 bands 3 - 7: 500 m
 daylight data only

Key Science Applications:
 global climate modeling, regional climate modeling, surface energy balance modeling, land cover characterization

Key Geophysical Parameters:
 surface reflectance

Processing Level:
 2

Product Type:
 standard, at-launch

Science Team Contact:
 E. Vermote

MODIS Surface Reflectance; Atmospheric Correction Algorithm Products (also called Spectral Reflectance)
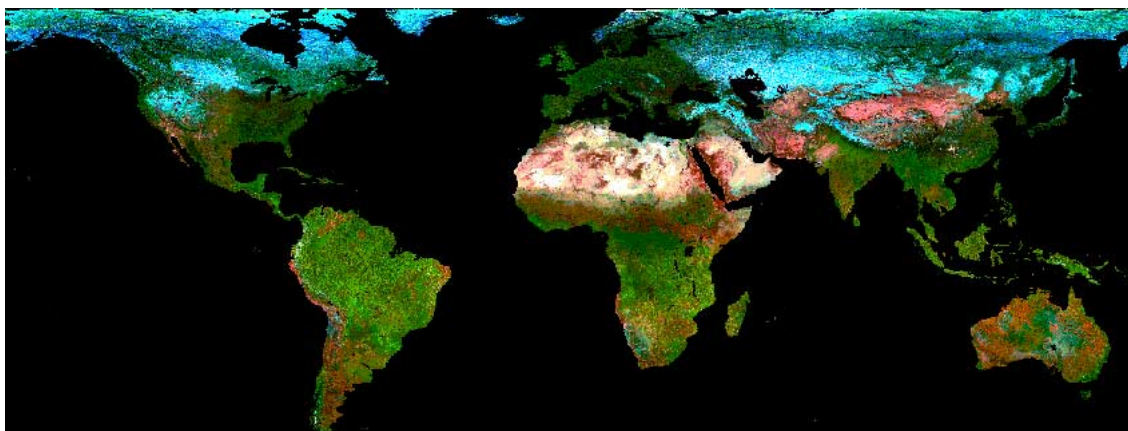

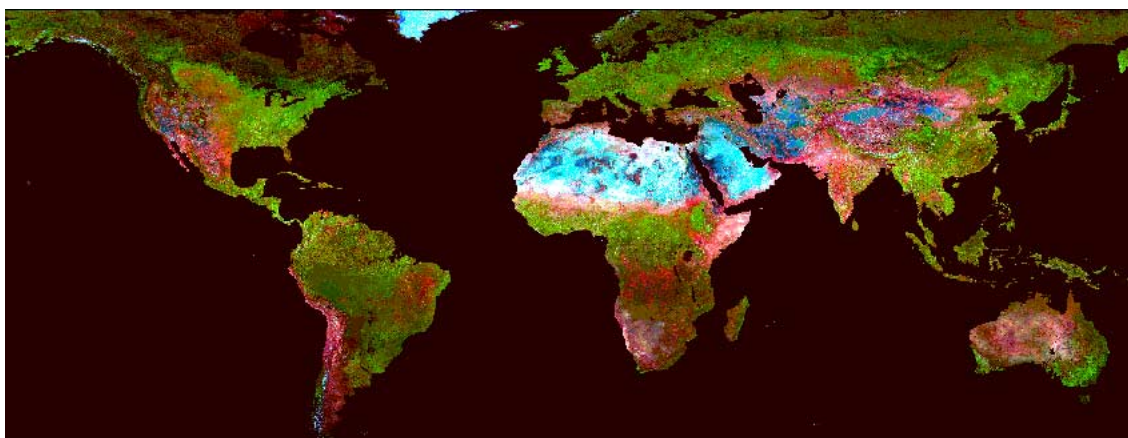*Figure 13.* **RGB composite (Red=3.75μm , Green=0.87 μm, Blue=0.67 μm) January 89**

Figure 14. **RGB composite (Red=3.75μm , Green=0.87 μm, Blue=0.67 μm) July 89.** These images were generated from AVHRR reflectances in channels 1 (0.67 μm), 2 (0.87 μm) and 3 (3.75 μm); channels 1 and 2 were corrected for atmospheric effects from rayleigh scattering, ozone (using TOMS gridded ozone product) and water vapor (using DAO total precipitable water). They reflect the state of land cover for January and July 89 : the green color produced by low values in AVHRR channels 1 and 3 and high values in channel 2 represents vegetated areas. Blue color in the January composite is produced for snow and residual clouds. The blue color over the desert in the July composite is due to the saturation of AVHRR channel 3 which leads to erroneous values of reflectance at 3.75 μm